

OMSC Position Statement on Ohio High School Mathematics Pathways

The Ohio Mathematics and Science Coalition applauds and supports the leadership of the Ohio Department of Education (ODE) and the Ohio Department of Higher Education (ODHE) to develop and disseminate mathematics pathways for Ohio students. This work is embodied in the project called Ohio High School Mathematics Pathways.

What Are High School Mathematics Pathways?

In 2018, the National Council of Teachers of Mathematics (NCTM) released a report entitled *Catalyzing Change in High School Mathematics*. Within *Catalyzing Change*, NCTM advocated for rigorous and equitable teaching and learning practices in high school mathematics and described in detail a set of *Essential Concepts* for high school mathematics. Two of the report's *key recommendations* were

- Each and every student should learn the Essential Concepts in order to expand professional opportunities, understand and critique the world, and experience the joy, wonder, and beauty of mathematics.
- High schools should offer continuous four-year **mathematics pathways** [emphasis added] with all students studying mathematics each year, including two or three years of mathematics in a common shared pathway focusing on the Essential Concepts, to ensure the highest-quality mathematics education for all students. (NCTM, 2018, p. 7).

NCTM went on to say that the “final one or two years of high school mathematics could offer students a variety of possible courses” (p. 88). It is in this spirit of an initial common shared pathway followed by a variety of rigorous alternatives that the state has launched the Ohio High School Mathematics Pathways project.

OMSC Support and Recommendations for the Pathways Project

The OMSC supports this work whole-heartedly and offers the following for consideration:

1. Rigorous mathematical pathways are needed for all students, regardless of whether they are bound for the workforce or for postsecondary education.
2. The success of the Pathways project will depend on constructive collaboration among secondary and postsecondary educators, STEM professionals, as well as professionals representing a wide variety of careers. Such collaboration is needed to determine, and then revise, what mathematics is useful in each of the pathways.
3. Very different kinds of resources will be needed in order to implement the various pathways. There should be a state-level effort to develop or identify ~~and then distribute~~ such resources.
4. These dramatic and important changes cannot be implemented without substantive professional development for high school teachers and significant changes in teacher preparation programs.
5. The ODE should undertake the development of a tool or process model to help high schools determine which and how many of the alternative pathways are feasible for implementation in their school.
6. Data, evidence, and research are needed to monitor and assess the effectiveness of the various pathways.
7. Success will depend on a well-developed and well-implemented public relations campaign to explain the pathways to parents and the public.
8. All students should continue to have access to a high-quality Algebra II course.
9. All students should study mathematics in all four years of high school. Every high school must help all students select and succeed in their chosen mathematical pathway.

Background and Rationale

The Ohio High School Mathematics Pathways project stems from similar work by the Ohio Mathematics Initiative (OMI), a collaborative of mathematics faculty members from the state's public colleges and universities, and high schools. The work of the OMI has resulted in expanding the definition of “gateway” courses from only College Algebra to also include Introduction to Statistics, Quantitative Reasoning, Data Science, and Technical Mathematics. (Two additional courses are being considered for gateway designation: Discrete Mathematics and Mathematics for Elementary School Teachers.)

The high school pathways work

- is in keeping with NCTM's (2018) recommendations,
- aligns with postsecondary gateway courses as just explained, and
- better meets the needs of students who will not pursue formal education after high school.

The Pathways project also addresses the change in high school graduation requirements that was enacted in 2006 and implemented beginning with the high school graduating class of 2014, requiring four years of mathematics and “Algebra II or its equivalent” (SB 311). A careful examination of the “or its equivalent” provision resulted in a decision that equivalency should be determined not by content, but by rigor, that is by the depth of thought required and the significance of the mathematics being taught.

Presently, ODE and ODHE draft materials suggest that equivalence to Algebra II could be achieved by a course in

- Quantitative Reasoning,
- Statistics and Probability, or
- Discrete Mathematics/Foundations of Computer Science.

These three courses together with a reinvigorated Algebra II course would provide alternatives for students with a wide range of interests and career goals. Detailed descriptions of Algebra II and each of these three alternative courses are being developed at the state level to provide assistance to schools as they strengthen Algebra II and implement one or more rigorous alternative courses. Other course options may be added in the future.